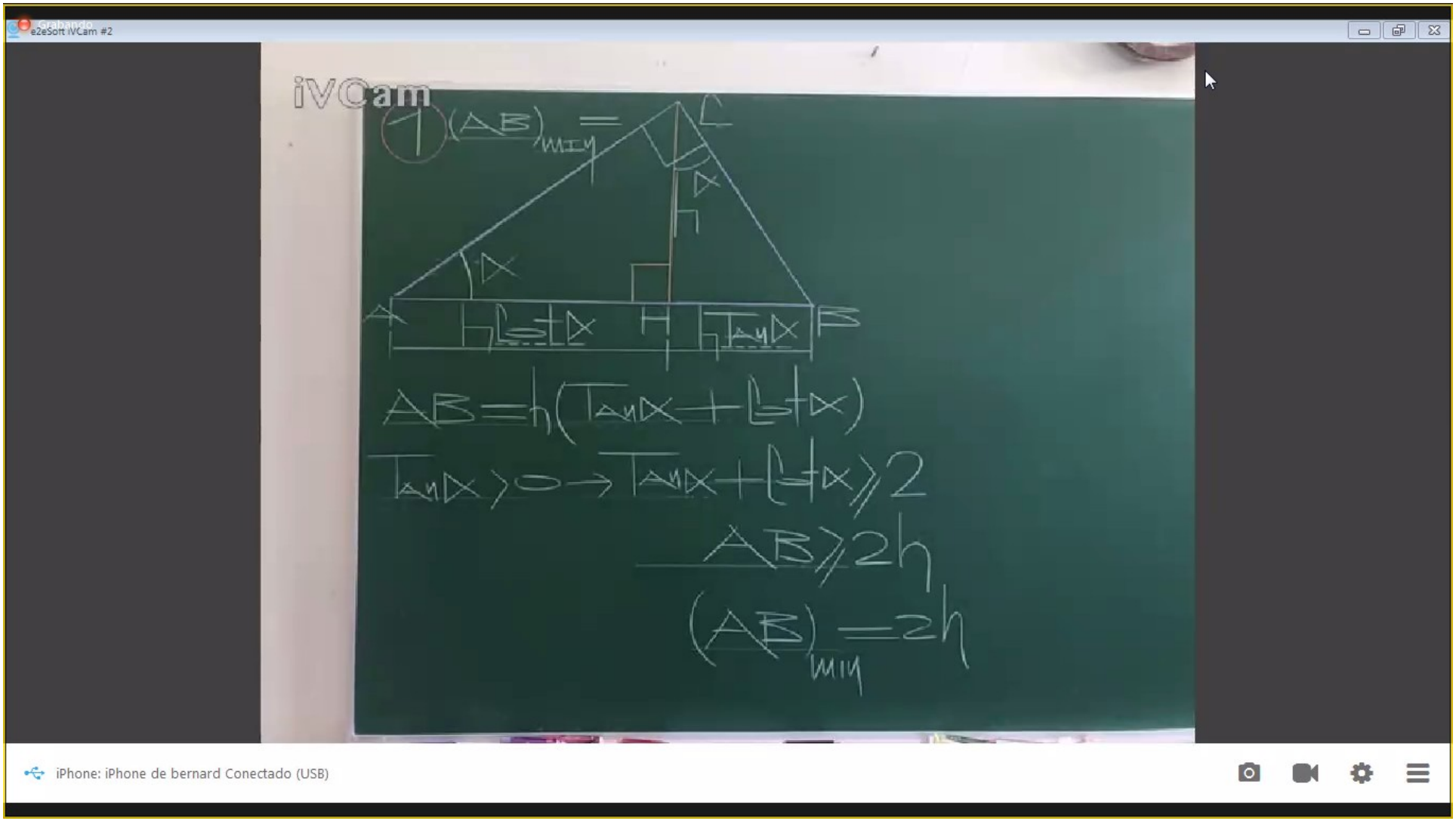
e2eSoft iVCam #2
iVCam
1) (AB)min =
α
α
h
A
B
h Cotα H h Tanα
AB = h(Tanα + Cotα)
Tanα > 0 → Tanα + Cotα ≥ 2
AB ≥ 2h
(AB)min = 2h
iPhone: iPhone de bernard Conectado (USB)

Grabando

CICLO REPASO UNI

UNI 2017-I

Al eliminar α y β de la igualdades

$p\,sen^2\alpha + q\cos^2\alpha = a$

$q\,sen^2\beta + q\cos^2\beta = b$

$p\tan\alpha = q\tan\beta.$

Donde $p \neq q$, obtenemos

A) $\frac{1}{p} - \frac{1}{q} = \frac{1}{a} - \frac{1}{b}$ B) $p + q = a + b$

C) $p - q = a + b$ D) $\frac{1}{p} + \frac{1}{q} = \frac{1}{a} + \frac{1}{b}$

E) $a + p = q + b$

UNI 2018-II

Si el ángulo θ satisface $sen\theta = 1 - sen^2\theta$

calcule el valor de $M = \csc^2\theta - \tan^2\theta$

A) $\frac{1}{2}$ B) $\sqrt{2}$ C) $\sqrt{3}$

D) 2 E) $\sqrt{5}$

UNI 2020-I

Si $1 + \tan^2\theta - \cot\theta = 0$

calcule el valor de

$E = \sqrt[3]{9 + \cos^4\theta - \tan^2\theta.\csc^2\theta}$

A) 1 B) 2 C) 3

D) 4 E) 5

UNI 2012-I

Determine el menor valor de K, para que se cumpla la siguiente desigualdad, para cualquier $x \in \mathbb{R}$, si $sen(x).\cos(x) \neq 0.$

$$\frac{1}{sen^2x} + \frac{1}{\cos^2x} \leq K$$

A) 7 B) 6 C) 5 D) 4 E) 3

Si $\tan^2\alpha = 2\tan^2x + 1$, halle el valor de

$y = \cos^2\alpha + sen^2x$

A) $sen^2\alpha$ B) $\cos^2\alpha$ C) $1 + sen^2\alpha$

D) $\tan^2\alpha$ E) $1 + \cos^2\alpha$

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Grabando

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UNI 2018-I

Al simplificar la expresión

$$K=\left[\cos^2\left(\frac{\pi}{3}+x\right)-\cos^2\left(\frac{\pi}{3}-x\right)-\frac{\sqrt{3}}{2}\right](1-\text{sen}2x)$$

se obtiene

A) $-\frac{\sqrt{3}}{2}\cos^2(2x)$ B) $\frac{\sqrt{3}}{2}\text{sen}^2(2x)$ C) $-\frac{\sqrt{3}}{2}\sec(2x)$

D) $\frac{\sqrt{3}}{2}\csc(2x)$ E) $\frac{\sqrt{3}}{2}$

UNI 2017-II

Calcule el mayor valor de $x<360^o$, correspondiente al máximo valor de $V=\text{sen}(4x)+\cos(4x)$.

A) $324^o45'$ B) $358^o45'$ C) $258^o45'$

D) $281^o15'$ E) $326^o15'$

En un triángulo acutángulo ABC. Calcule el valor de:

$$T=\frac{\cos(A-B)}{\text{sen}A.\text{sen}B}+\frac{\cos(B-C)}{\text{sen}B.\text{sen}C}+\frac{\cos(A-C)}{\text{sen}A.\text{sen}C}$$

A) 3 B) 4 C) 5

C) 5 E) 8

UNI 2015-I

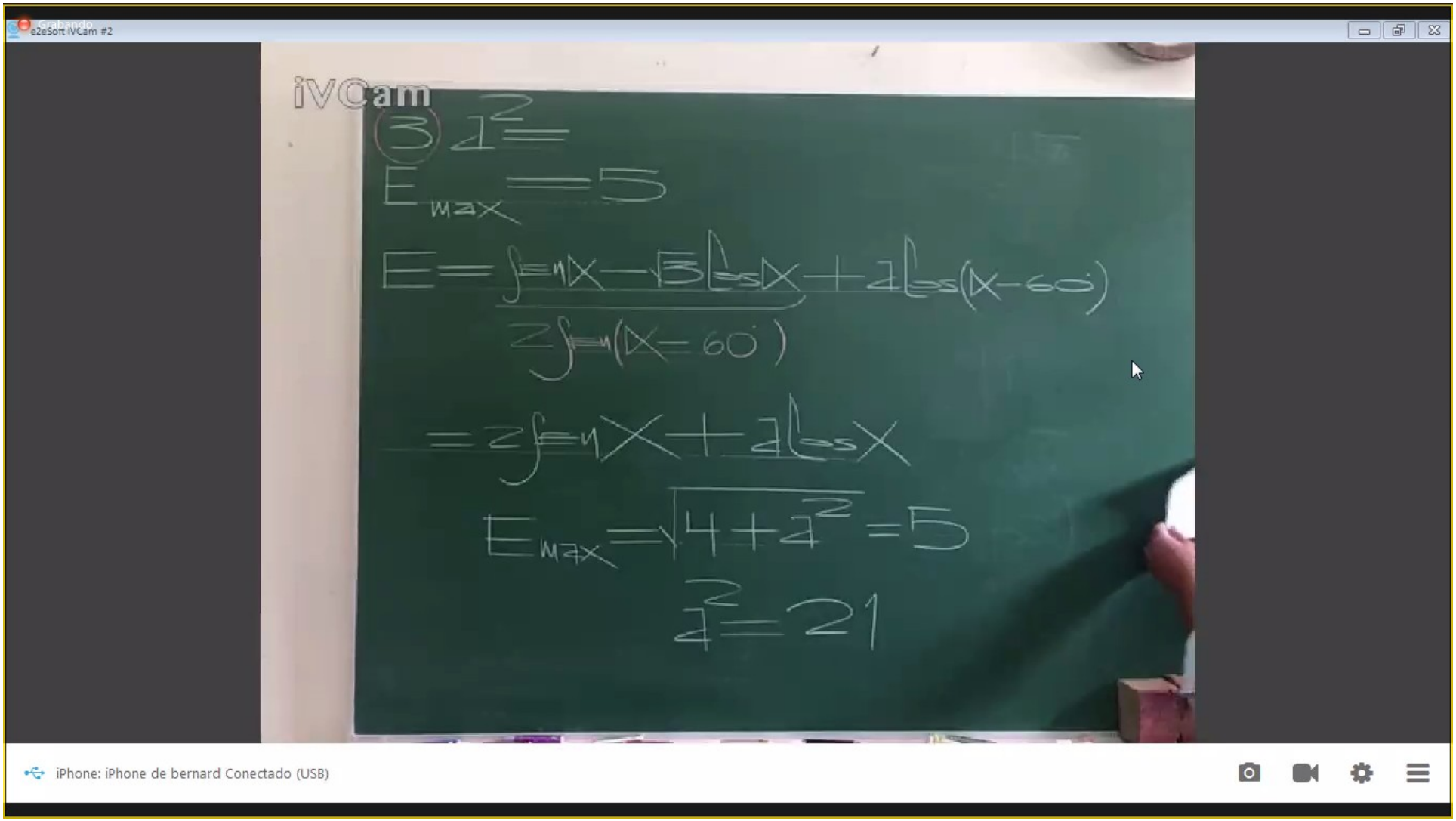
Al simplificar la expresión

$$K=\left[\cos^2\left(\frac{\pi}{3}+x\right)-\cos^2\left(\frac{\pi}{3}-x\right)-\frac{\sqrt{3}}{2}\right](1-\text{sen}2x)$$

se obtiene

A) $-\frac{\sqrt{3}}{2}\cos^2(2x)$ B) $\frac{\sqrt{3}}{2}\text{sen}^2(2x)$ C) $-\frac{\sqrt{3}}{2}\sec(2x)$

D) $\frac{\sqrt{3}}{2}\csc(2x)$ E) $\frac{\sqrt{3}}{2}$


e2eSoft iVCam #2
iVCam
(3) a² =
E max = 5
E = f = 1/2 x − √3/2 sen x + a sen(x − 60°)
2f = 1(x − 60°)
= 2f = 1 x + a sen x
E max = √(4 + a²) = 5
a² = 21
iPhone: iPhone de bernard Conectado (USB)

Grabando

CICLO REPASO UNI

UNI 2015-II

Si para $\emptyset \in [0; 2\pi]$ se tiene

$\text{sen}\emptyset + \cos\emptyset + \text{sen}2\emptyset = [\text{sen}\emptyset + \cos\emptyset + A]^2 + B$

entonces $(2A + 4B)$ es igual a:

A) -1 B) -2 C) -3

D) -4 E) -5

UNI 2015-I

Si $x \in \left\langle 0; \frac{\pi}{2} \right\rangle$ y $\sqrt{\frac{1+\text{sen}(x)}{1-\text{sen}(x)}} = \tan\left(\frac{x}{a} + \frac{\pi}{2a}\right)$

Calcule el valor de (a^2+1)

A) 2 B) 3 C)4

D) 5 E) 6

UNI 2019-II

Cuantos valores de $x \in \left\langle -\frac{\pi}{2}; \frac{\pi}{2} \right\rangle$ satisfacen la ecuación $6\text{sen}(2x) - 8\cos x + 9\text{sen}x - 6 = 0$

A) 1 B) 2 C) 3 D) 4 E) 6

UNI 2012-II

En la siguiente ecuación trigonométrica

$$\cos^4\left(\frac{x}{2}\right) - \frac{1}{8}\cos(2x) = \frac{7}{8}$$

El número de soluciones en $[0; 2\pi]$ es:

A) 1 B) 2 C) 3 D) 4 E) 5

Grabando

CICLO REPASO UNI

III.1 IDENTIDADES DE VARIABLE DOBLE

$\text{Sen}2\theta = 2\text{sen}\theta\cos\theta$

$\cos 2\theta = \cos^2\theta - \text{sen}^2\theta$

$\tan 2\theta = \dfrac{2\tan\theta}{1-\tan^2\theta}$

$2\cos^2\theta = 1 + \cos 2\theta$

$2\text{sen}^2\theta = 1 - \cos 2\theta$

IDENTIDADES DE DEGRADACIÓN

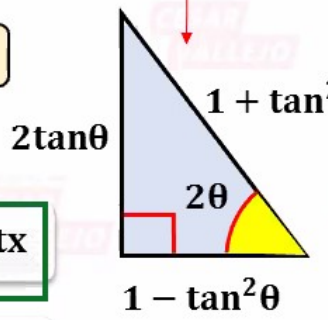
IDENTIDADES AUXILIARES

$\cot\theta + \tan\theta = 2\csc 2\theta$

$\cot\theta - \tan\theta = 2\cot 2\theta$

$\cot\left(\dfrac{x}{2}\right) = \csc x + \cot x$

$\tan\left(\dfrac{x}{2}\right) = \csc x - \cot x$



III.2 IDENTIDADES DE VARIABLE TRIPLE

$\text{sen}3x = 3\text{sen}x - 4\text{sen}^3 x$

$\cos 3x = 4\cos^3 x - 3\cos x$

$\tan 3x = \dfrac{3\tan x - \tan^3 x}{1 - 3\tan^2 x}$

IDENTIDADES AUXILIARES

$\text{sen}3x = \text{sen}x(2\cos 2x + 1)$

$\cos 3x = \cos x(2\cos 2x - 1)$

$\text{sen}3x = 4\text{sen}x\,\text{sen}(60° - x)\text{sen}(60° + x)$

$\cos 3x = 4\cos x\cos(60° - x)\cos(60° + x)$

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Grabando

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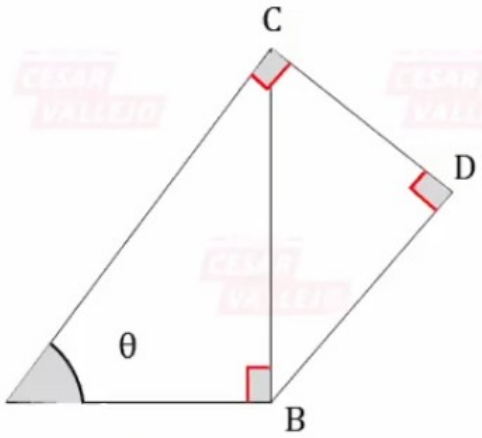
PROBLEMA 1

En el gráfico $0 < \theta < \frac{\pi}{4}$,

además $\frac{AC}{CD} = K$

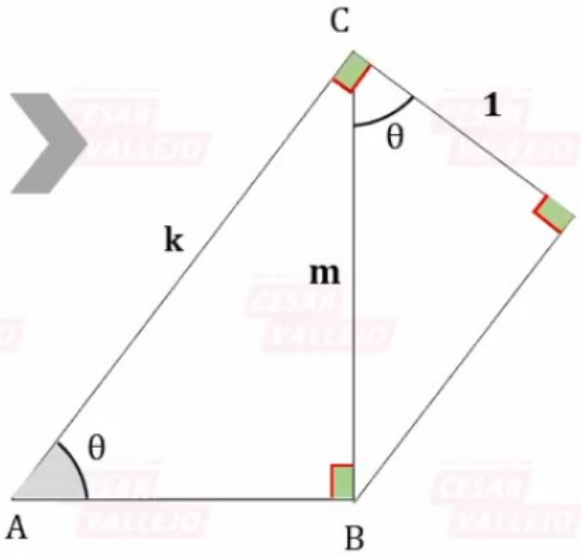


calcule $\tan\theta - \cot\theta$.

A) $\sqrt{K^2+4}$ B) $-\sqrt{K^2+4}$ C) $-\sqrt{K^2-2}$

D) $-\sqrt{K^2-4}$ E) $\sqrt{K^2-4}$

Resolución



del gráfico :

$$\sec\theta\csc\theta = \frac{m}{1} \times \frac{k}{m}$$

$$\tan\theta + \cot\theta = \sec\theta.\csc\theta$$

entonces:

$\tan\theta + \cot\theta = k$

$\tan\theta - \cot\theta = x$

identidad de legendre:

$$(\tan\theta + \cot\theta)^2 - (\tan\theta - \cot\theta)^2 = 4\tan\theta\cot\theta$$

$$(k)^2 - (x)^2 = 4$$

$$\Rightarrow \quad x^2 = k^2 - 4$$

$$x = \pm\sqrt{k^2-4}$$

como , $\theta < \frac{\pi}{4}$ $\tan\theta < 1$ $\cot\theta > 1$

$$\Rightarrow \quad \tan\theta - \cot\theta < 0$$

$$\therefore \quad x = -\sqrt{k^2-4}$$

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Grabando

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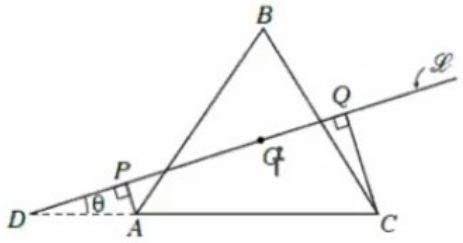
PROBLEMA 2

En el grafico ABC es un triángulo equilátero de altura h,calcule la medida del ángulo GDC, si 2(AP) + 3(CQ) es máximo.

considere al punto G, baricentro de la region triangular ABC



A) $\arctan\frac{\sqrt{3}}{4}$ B) $\arctan\frac{\sqrt{3}}{5}$ C) $\arctan\frac{\sqrt{3}}{6}$

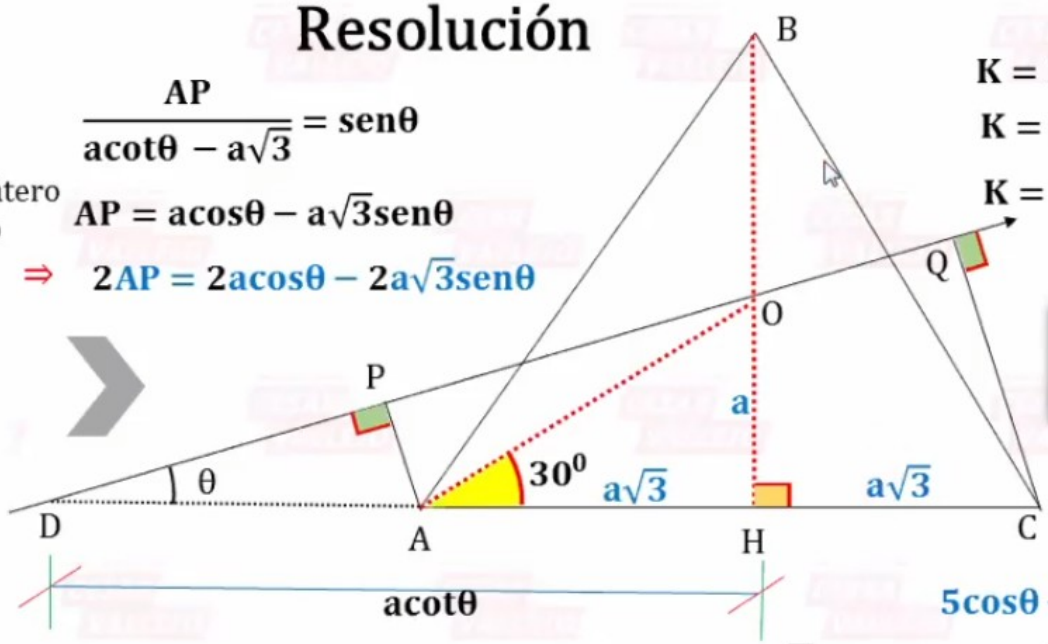
D) $\arctan\frac{\sqrt{3}}{7}$ E) $\arctan\frac{\sqrt{3}}{8}$

Resolución

$$\frac{AP}{a\cot\theta - a\sqrt{3}} = \operatorname{sen}\theta$$

$$AP = a\cos\theta - a\sqrt{3}\operatorname{sen}\theta$$

$$\Rightarrow 2AP = 2a\cos\theta - 2a\sqrt{3}\operatorname{sen}\theta$$



$$\frac{CQ}{a\cot\theta + a\sqrt{3}} = \operatorname{sen}\theta$$

$$CQ = a\cos\theta + a\sqrt{3}\operatorname{sen}\theta$$

$$\Rightarrow 3CQ = 3a\cos\theta + 3a\sqrt{3}\operatorname{sen}\theta$$

$$K = 2(AP) + 3(CQ)$$

$$K = 5a\cos\theta + a\sqrt{3}\operatorname{sen}\theta$$

$$K = a\left(5\cos\theta + \sqrt{3}\operatorname{sen}\theta\right)$$

K = máximo

$$a\operatorname{sen}x + b\cos x \le \sqrt{a^2 + b^2}$$

$$K = a\left(\sqrt{28}\right)$$

entonces:

$$5\cos\theta + \sqrt{3}\operatorname{sen}\theta = \sqrt{28}$$

$$\operatorname{sen}\theta = \frac{\sqrt{3}}{\sqrt{28}};\quad \cos\theta = \frac{5}{\sqrt{28}} \rightarrow \tan\theta = \frac{\sqrt{3}}{5}$$

$$\therefore \theta = \arctan\frac{\sqrt{3}}{5}$$

Clave B

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Grabando

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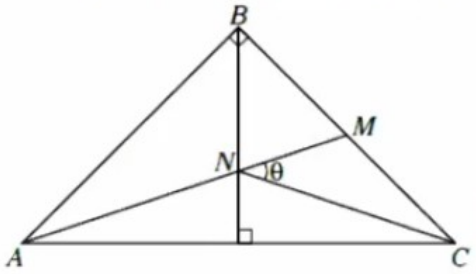
PROBLEMA 3

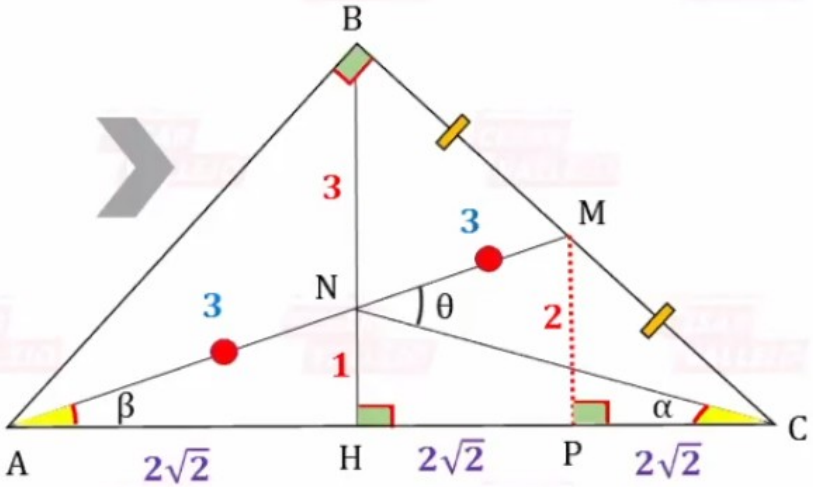
Si $BM=MC$ y $AN=MN$, calcule $\tan\theta$.



A) $\frac{2\sqrt{2}}{5}$ B) $\frac{4\sqrt{2}}{23}$ C) $\frac{4\sqrt{2}}{21}$

D) $\frac{8\sqrt{3}}{25}$ E) $\frac{4\sqrt{2}}{29}$

Resolución



Trazamos MP , perpendicular a AC

consideremos, NH= 1 $\Rightarrow$ MP = 2

como , MP = 2 $\Rightarrow$ BH = 4

$\triangle AHN$: $AH = 2\sqrt{2}$

del gráfico :

$$\tan\beta = \frac{1}{2\sqrt{2}}$$

$$\tan\alpha = \frac{1}{4\sqrt{2}}$$

$$\theta = \alpha + \beta$$

$$\rightarrow \tan\theta = \tan(\alpha+\beta)$$

$$\rightarrow \tan\theta = \frac{\tan\alpha + \tan\beta}{1 - \tan\alpha\tan\beta}$$

$$\rightarrow \tan\theta = \frac{\frac{1}{4\sqrt{2}} + \frac{1}{2\sqrt{2}}}{1 - \frac{1}{4\sqrt{2}} \times \frac{1}{2\sqrt{2}}}$$

$$\rightarrow \tan\theta = \frac{6\sqrt{2}}{15}$$

$$\therefore \tan\theta = \frac{2\sqrt{2}}{5}$$

Clave A

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Grabando

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PROBLEMA 4

Si $\operatorname{sen}\left(\frac{\pi}{12}-\frac{x}{2}\right)=\frac{\sqrt{2}}{4}$, halle $\sqrt{3}\cos x+\operatorname{sen} x$.

A) $\frac{3}{2}$ B) $\frac{1}{3}$ C) $\frac{2}{3}$

D) $\frac{1}{2}$ E) $\frac{3}{4}$

Resolución

por condición :

$$\operatorname{sen}\left(\frac{\pi}{12}-\frac{x}{2}\right)=\frac{\sqrt{2}}{4}$$

$$\operatorname{sen}\left(15^0-\frac{x}{2}\right)=\frac{\sqrt{2}}{4}$$

$$K=\sqrt{3}\cos x+\operatorname{sen} x$$

$$K=2\left(\frac{\sqrt{3}}{2}\cos x+\frac{1}{2}\operatorname{sen} x\right)$$

$$K=2(\cos 30^0\cos x+\operatorname{sen}30^0\operatorname{sen}x)$$

$$\operatorname{Cos}(x-y)=\operatorname{Cos}x.\operatorname{Cos}y+\operatorname{Sen}x.\operatorname{Sen}y$$

$$K=2\cos(30^0-x).....I$$

$$\cos 2\theta=1-2\operatorname{sen}^2\theta$$

reemplazamos en I

$$K=2\left(1-2\operatorname{sen}^2\left(15^0-\frac{x}{2}\right)\right)$$

$$K=2-4\operatorname{sen}^2\left(15^0-\frac{x}{2}\right)$$

$$K=2-4\left(\frac{1}{8}\right)$$

$$\therefore\ K=\frac{3}{2}$$

Clave A

Grabando

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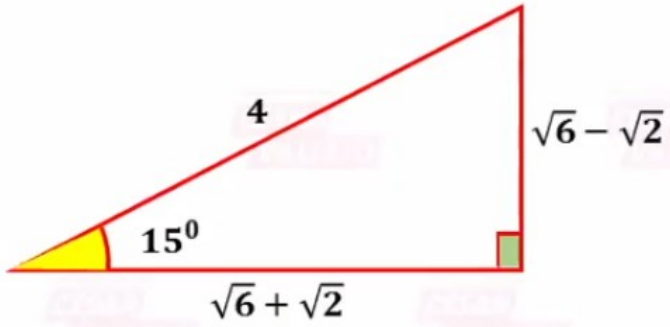
PROBLEMA 5

calcule el valor de

$$\frac{\sqrt{3}-1}{\sqrt{1+\operatorname{sen}\frac{\pi}{9}}}+\frac{\sqrt{3}+1}{\sqrt{1-\operatorname{sen}\frac{\pi}{9}}}$$

A) 4 B) 8 C) $4\sqrt{3}$
D) $8\sqrt{3}$ E) $6\sqrt{3}$



Resolución

$$K=\frac{\sqrt{3}-1}{\sqrt{1+\operatorname{sen}\frac{\pi}{9}}}+\frac{\sqrt{3}+1}{\sqrt{1-\operatorname{sen}\frac{\pi}{9}}}$$

$$K=\frac{\sqrt{3}-1}{\sqrt{1+\operatorname{sen}20^0}}+\frac{\sqrt{3}+1}{\sqrt{1-\operatorname{sen}20^0}}$$

$$K=\frac{\sqrt{3}-1}{\sqrt{1+\cos 70^0}}+\frac{\sqrt{3}+1}{\sqrt{1-\cos 70^0}}$$

$$2\cos^2\theta = 1+\cos 2\theta$$

$$2\operatorname{sen}^2\theta = 1-\cos 2\theta$$

$$K=\frac{\sqrt{3}-1}{\sqrt{2\cos^2 35^0}}+\frac{\sqrt{3}+1}{\sqrt{2\operatorname{sen}^2 35^0}}$$

$$K=\frac{\sqrt{3}-1}{\sqrt{2}\cos 35^0}+\frac{\sqrt{3}+1}{\sqrt{2}\operatorname{sen}35^0}$$

$$K=\frac{\sqrt{6}-\sqrt{2}}{2\cos 35^0}+\frac{\sqrt{6}+\sqrt{2}}{2\operatorname{sen}35^0}$$

$$\frac{K}{2}=\frac{\sqrt{6}-\sqrt{2}}{4\cos 35^0}+\frac{\sqrt{6}+\sqrt{2}}{4\operatorname{sen}35^0}$$

$$\frac{K}{2}=\frac{\operatorname{sen}15^0}{\cos 35^0}+\frac{\cos 15^0}{\operatorname{sen}35^0}$$

$$\frac{K}{2}=\frac{\cos 35^0\cos 15^0+\operatorname{sen}35^0\operatorname{sen}15^0}{\operatorname{sen}35^0\cos 35^0}$$

$$\frac{K}{2}=\frac{\cos 20^0}{\operatorname{sen}35^0\cos 35^0}$$

$$\frac{K}{2}=\frac{2\operatorname{sen}35^0\cos 35^0}{\operatorname{sen}35^0\cos 35^0}$$

$\therefore K=4$

Clave A

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Grabando

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PROBLEMA 8

A partir de la identidad

$\text{sen}^2x\cos^3x = m\cos x + n\cos 3x + p\cos 5x$

Calcule $m-2n+p$.

A) $\frac{1}{16}$ B) $\frac{1}{8}$ C) $\frac{3}{16}$

D) $\frac{1}{64}$ E) $\frac{3}{32}$

Resolución

$M = \text{sen}^2 x \cos^3 x$

$4M = 4\text{sen}^2 x \cos^2 x \cos x$

$\text{Sen}2\theta = 2\text{sen}\theta\cos\theta$

$4M = \text{sen}^2 2x \cos x$

$8M = 2\text{sen}^2 2x \cos x$

$2\text{sen}^2\theta = 1 - \cos 2\theta$

$8M = (1 - \cos 4x)\cos x$

$8M = \cos x - \cos x \cos 4x$

$16M = 2\cos x - 2\cos x \cos 4x$

$2\cos A \cos B = \cos(A+B) + \cos(A-B)$

$16M = 2\cos x - (\cos 5x + \cos 3x)$

$16M = 2\cos x - \cos 3x - \cos 5x$

$M = \frac{2}{16}\cos x - \frac{1}{16}\cos 3x - \frac{1}{16}\cos 5x$

comparando:

$\mathbf{m = \frac{2}{16}}$

$\mathbf{n = -\frac{1}{16}}$

$\mathbf{p = -\frac{1}{16}}$

$\therefore\ \mathbf{m - 2n + p = \frac{3}{16}}$

Clave C

Grabando

CICLO REPASO UNI

PROBLEMA 9

A partir de las condiciones

$\operatorname{sen}2\theta = 2(\sqrt{2}-1)$

$\frac{\pi}{4} < \theta < \frac{\pi}{2}$

calcule el valor de $\tan\theta - \operatorname{sen}\theta$.

A) 1

B) $\sqrt{2}-1$

C) $\sqrt{2}$

D) $\frac{\sqrt{2}-1}{2}$

E) $2\sqrt{2}$

Resolución

$\operatorname{sen}2\theta = 2(\sqrt{2}-1)$

$\operatorname{Sen}2\theta = 2\operatorname{sen}\theta\cos\theta$

$2\operatorname{sen}\theta\cos\theta = 2(\sqrt{2}-1)$

$\operatorname{sen}\theta\cos\theta = \sqrt{2}-1$

$K = \tan\theta - \operatorname{sen}\theta$

$K = \frac{\operatorname{sen}\theta}{\cos\theta} - \operatorname{sen}\theta$

$K = \frac{\operatorname{sen}\theta - \operatorname{sen}\theta\cos\theta}{\cos\theta}$

$\frac{\pi}{4} < \theta < \frac{\pi}{2}$

$\operatorname{sen}\theta > \cos\theta$

$\operatorname{sen}\theta - \cos\theta > 0$

$(\operatorname{sen}\theta - \cos\theta)^2 = 1 - \operatorname{sen}2\theta$

$(\operatorname{sen}\theta - \cos\theta)^2 = 1 - 2(\sqrt{2}-1)$

$(\operatorname{sen}\theta - \cos\theta)^2 = 3 - 2\sqrt{2}$

$(\operatorname{sen}\theta - \cos\theta)^2 = (\sqrt{2}-1)^2$

$\operatorname{sen}\theta - \cos\theta = \sqrt{2}-1$

$\operatorname{sen}\theta - \cos\theta = \operatorname{sen}\theta\cos\theta$

$\operatorname{sen}\theta - \operatorname{sen}\theta\cos\theta = \cos\theta$

$\therefore K = 1$

Clave A

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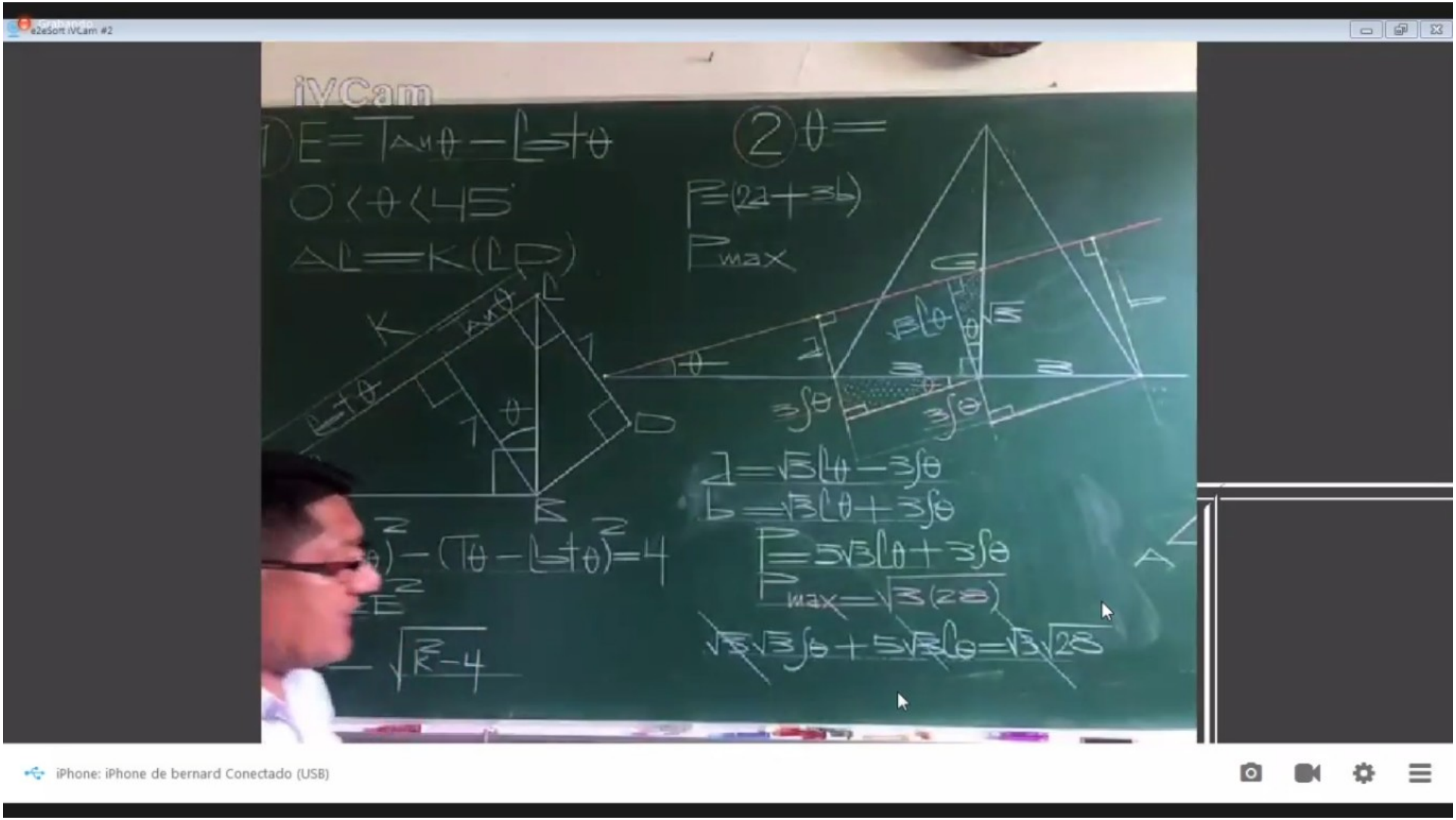
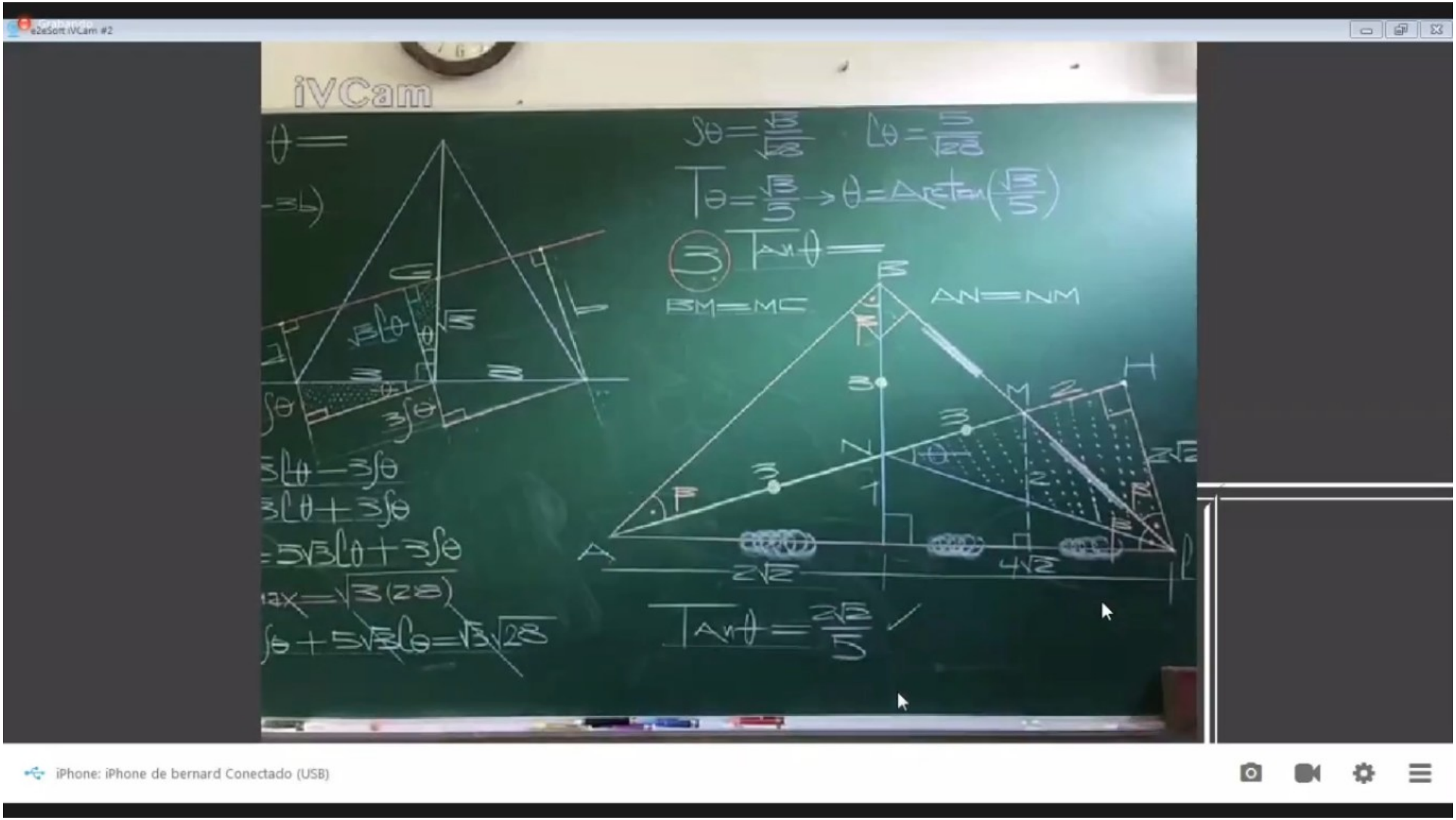

e2eSoft iVCam #2
iVCam
2θ=
P=(2a+3b)
Pmax
AL=K(LP)
0<θ<45
a=√3Lθ−3Sθ
b=√3Lθ+3Sθ
P=5√3Lθ+3Sθ
Pmax=√3(28)
√5√3Sθ+5√3Lθ=√3√28
iPhone: iPhone de bernard Conectado (USB)


e2eSoft iVCam #2
iVCam
AN = NM
BM = MC
iPhone: iPhone de bernard Conectado (USB)